



# Primary Vacuum System

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T. Anderson, S. Childress  
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- System Description
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# Vacuum System Parameters

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- Primary transport vacuum system specifications are driven both by the need for low beam loss and the choice of beam instrumentation.  
Design parameters include:
  - The use of an isolation valve which will close based on vacuum pressure (several  $\times 10^{-6}$  Torr) to separate Main Injector and NuMI vacuum systems.
  - No vacuum system windows are to be used.
  - System vacuum pressures of  $10^{-5}$  Torr are needed to have minimal effect on beam loss levels. Similar pressure levels are needed for good function of the multi-wire and BPM's.
  - Specification of distributed ion pump systems provides the vacuum environment needed for reliable instrumentation function and low beam loss, as well as a robust low maintenance vacuum system. Use of ion pumps leads to vacuum levels of  $< 10^{-6}$  Torr.
- NuMI vacuum system choices are consistent with those for other beam transfer lines linking to the Main Injector.



# System Description

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- Isolation valve NuMI / MI downstream of Lambertsons & C-magnet. Also valves at beam cross-over region, carrier pipe, and downstream pre-target.
- Distributed 30l/sec ion pumps along line
  - Most sensitive to pressure at Lambertsons (link to MI). Otherwise, reasonable level for ion pumps; project  $\sim 2 \cdot 10^{-7}$  Torr.
- Three large ion pumps each end of carrier pipe
  - 420 ft. long 10" diameter stainless steel pipe. No intermediate pumping.
  - Project  $\sim$  order of magnitude pressure rise within pipe. Need  $< 10^{-5}$  Torr.
- Layout details on system piping and instrumentation diagram.

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